

What is claimed is:

1. A data multiplexing method comprising the steps of:

5       storing a video stream and an audio stream in first and second buffers, respectively;

      comparing said video stream and audio stream from said first and second buffers with each other to determine an order of packets and a parameter in such a way that in generation of a multiplexed stream to be 10 outputted, a difference of playback start time or a difference of playback end time of video and audio to be recorded in a same video object unit becomes equal to or smaller than a threshold; and

15       dividing said video stream and audio stream from said first and second buffers into data blocks in accordance with said parameter and adding headers to said data blocks to produce packets, multiplexing said packets and outputting a multiplexed stream.

20       2. A data recorded medium on which a multiplexed stream is recorded that includes a video stream and an audio stream and is acquired by dividing each of said video stream and said audio stream into data blocks, adding headers to said data blocks to produce packets 25 and multiplexing said packets,

      said multiplexed stream being such that a difference of playback start time or a difference of playback end time of video and audio included in a

specific one of video object units each having a series of packets including at least one group of pictures, which is a video encoding unit in said video stream, becomes equal to or smaller than a threshold.

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3. The data recorded medium according to claim 1, wherein said threshold is an integer multiple of a duration time of reproduction of an audio access unit.

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4. A data recorded medium on which a multiplexed stream is recorded that includes a video stream and an audio stream and is acquired by dividing each of said video stream and said audio stream into data blocks, adding headers to said data blocks to produce packets and multiplexing said packets and which is of a model that allows said multiplexed stream to be read in a buffer of a decoder packet by packet and to be outputted picture by picture and audio access unit by audio access unit in accordance with a playback time,

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said multiplexed stream being such as to satisfy a condition of  $T_{ea} \leq T_{sv}$  where  $T_{sv}$  is a read start time of a head packet in a specific one of video object units each having a series of packets including at least one group of pictures, which is a video encoding unit in said video stream, and  $T_{ea}$  is a read end time of a packet including data of a last portion of an audio access unit having a playback end time after but closest to a playback start time of video included in

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said specific video object unit or an audio access unit having a playback end time after but closest to that playback start time.

5 5. The data recorded medium according to claim 4, wherein said threshold is an integer multiple of a duration time of reproduction of said audio access unit.

10 6. A data recording apparatus for dividing each of a plurality of streams including a video stream and an audio stream into data blocks, adding headers to said data blocks to produce packets, multiplexing said packets and recording said multiplexed packets, comprising:

15 first buffer means for storing said video stream;  
second buffer means for storing said audio stream;  
a control section for comparing said video stream from said first buffer means with said audio stream  
20 from said second buffer means to determine an order of packets and a parameter in such a way that a difference of playback start time or a difference of playback end time of video and audio to be recorded in a same video object unit in a multiplexed stream to be outputted  
25 becomes equal to or smaller than a threshold and outputting said parameter; and  
a multiplexing section for dividing said video stream from said first buffer means and said audio

stream from said second buffer means into data blocks in accordance with said parameter and adding headers to said data blocks to produce packets, multiplexing said packets and outputting a multiplexed stream.

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7. The data recording apparatus according to claim 6, wherein said threshold is an integer multiple of a duration time of reproduction of an audio access unit.

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8. A program for allowing a computer to execute procedures of dividing each of a plurality of streams including a video stream and an audio stream into data blocks, adding headers to said data blocks to produce packets, multiplexing said packets and recording said multiplexed packets, comprising:

a first step of storing said video stream and said audio stream in buffers;

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a second step of comparing said video stream and audio stream read from said buffers with each other to determine a multiplexing timing in such a way that a difference of playback start time or a difference of playback end time of video and audio to be recorded in a same video object unit in a multiplexed stream to be outputted becomes equal to or smaller than a threshold and outputting said parameter; and

a third step of multiplexing video packets and audio packets in accordance with said multiplexing

timing and outputting a multiplexed stream.

9. The program according to claim 8, wherein  
said threshold is an integer multiple of a duration  
5 time of reproduction of an audio access unit.

10. The program according to claim 8, wherein  
said second step includes:

10 a fourth step of discriminating and separating  
said video stream and said audio stream;  
a fifth step of detecting a picture in said video  
stream and calculating a playback time;

15 a sixth step of detecting an audio access unit of  
said audio stream and calculating a playback time;

a seventh step of determining a data division  
position and making data blocks for said video stream;

an eighth step of determining a data division  
position and making data blocks for said audio stream;

20 a ninth step of calculating a capacity of a  
virtual video buffer for said video stream and  
calculating a range of a video multiplexing timing;

a tenth step of calculating a capacity of a  
virtual audio buffer for said audio stream and  
calculating a range of an audio multiplexing timing;

25 an eleventh step of determining final  
multiplexing timings for video and audio packets from  
said playback times and said capacities of said virtual  
buffers for said video stream and said audio stream;

and

a twelfth step of adding headers to said data blocks to produce packets and outputting said packets in accordance with said final multiplexing timings.

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11. The program according to claim 10, wherein said threshold is an integer multiple of a duration time of reproduction of said audio access unit.

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12. A decoder comprising:

a demultiplexer for separating at least a video stream and an audio stream from a multiplexed stream including said video stream and said audio stream;

a video decoding section for playing back video via a video buffer for buffering said separated video stream; and

an audio decoding section for playing back audio via an audio buffer for buffering said separated audio stream,

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a capacity of said audio buffer being set equal to or larger than a value obtained by adding a maximum value of a delay time of a picture in said video stream in said multiplexed stream with respect to a video buffering verifier and a playback time of one frame of said video stream together and multiplying a resultant value by a maximum bit rate of said audio stream.